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Karmarkar

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[54] METHODS AND APPARATUS FOR  
EFFICIENT RESOURCE ALLOCATION

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[57] ABSTRACT

A method and apparatus for optimizing resource alloca-  
tions is disclosed which proceeds in the interior of the  
solution space polytope instead of on the surface (as  
does the simplex method), and instead of exterior to the  
polytope (as does the ellipsoid method). Each suc-  
cessive approximation of the solution point, and the poly-  
tope, are normalized such that the solution point is at  
the center of the normalized polytope. The objective  
function is then projected into the normalized space and  
the next step is taken in the interior of the polytope, in  
the direction of steepest-descent of the objective func-  
tion gradient and of such a magnitude as to remain  
within the interior of the polytope. The process is re-  
peated until the optimum solution is closely approxi-  
mated. The optimization method is sufficiently fast to be  
useful in real time control systems requiring more or  
less continual allocation optimization in a changing  
environment, and in allocation systems heretofore too  
large for practical implementation by linear program-  
ming methods.

36 Claims, 5 Drawing Sheets

